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OPERATING MANUAL FOR MISTRAL 10OO & 2000 CENTRIFUGES

PLEASE READ CAREFULLY

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Thank you for buying an MSE centrifuge. Please read the enclosed operating manual before using your centrifuge; it will provide you and your colleagues with useful information on all aspects of the centrifuge and its accessories.

As our customer, we should like to ensure that you are totally satisfied at all times. Do not hesitate to contact MSE - your views are very important to us.

MSE Scientific Instruments

1. General Description

The MISTRAL 1000 and 2000 high performance bench top centrifuges join the well established range of MSE MISTRAL centrifuges.

The MISTRAL range now consists of:

MISTRAL 1000
MISTRAL 2000
MISTRAL 3000i
MISTRAL 3000E
MISTRAL 6000

The entire MISTRAL range of centrifuges has been designed to meet the present and future demands of routine and research laboratories.

A comprehensive range of rotors and accessories are available to accommodate the most commonly used centrifuge tubes and bottles.

In the MISTRAL 1000 and the MISTRAL 2000, MSE have utilised the best of current technology to produce the most advanced, safe and reliable instruments possible.

ADVANCED DESIGN FEATURES INCLUDE:

* INTELLIGENT MICROPROCESSOR CONTROL

* LCD DISPLAY/CONTROL PANEL

* AUTOMATIC ROTOR IDENTIFICATION SYSTEM

* SPEED CONTROL TO WITHIN ±25 rpm

* RUN TO RCF (RELATIVE CENTRIFUGAL FORCE)

* LAST RUN RECALL

* OVERSPEED PREVENTION

* FULL LID INTERLOCK

* IMBALANCE MONITOR

* BRAKE RATE SELECTION

* SELF-DIAGNOSTIC DISPLAY

* ROBUST MOULDED BODY

* REMOVABLE INNER BOWL

2. Important Information for Good Operator Practice

Spillages

In the event of liquid spillage, the affected surfaces should be cleaned immediately.

The rotor and accessories should be removed and, if necessary, the inner bowl should be removed for thorough cleaning, (see Section 10).

Regular cleaning of the centrifuge is highly recommended to avoid the build up of contamination.

Materials with specific gravity in excess of 1.2

The maximum speed of each rotor is calculated on the basis of samples with a specific gravity of 1.2. If materials of a higher specific gravity are used, then the maximum rotor speed must be reduced according to the formula below.

$$M = \sqrt{\frac{1.2 \times N^2}{S}} \text{ rpm}$$

Where M = New maximum speed
N = Normal maximum speed
S = Specific gravity of sample

Corrosive materials

Where particularly corrosive materials are to be centrifuged, the samples should be placed in sealed containers and all necessary precautions observed. The following list gives examples of corrosive materials used in laboratories.

Phenol/cresol/water, chloroform/isoamyl alcohol, salt solutions (especially ammonium sulphate), solutions of ammonium hydroxide and acidic solutions eg hydrochloric, trichloracetic and perchloric acids.

Other materials are often equally corrosive and the user is responsible for checking the characteristics of solutions used.

Infective samples

Very special care is necessary when infective materials are to be centrifuged. Sealed containers should always be used. The caps should be doublé checked to ensure that they are not damaged and fit correctly prior to starting the centrifuge. After use, containers and caps should be sterilised immediately, using a non-corrosive method.

IT IS ADVISABLE TO HAVE THIS CENTRIFUGE SERVICED BY A COMPETENT ENGINEER, PREFERABLY THE MANUFACTURER'S REPRESENTATIVE, EVERY SIX MONTHS, (SEE SECTION 10).

3. Installing the Centrifuge

IMPORTANT: THE ROTOR MUST NOT BE FITTED WHEN MOVING OR DURING TRANSIT

Preparation

Remove the centrifuge from its packing and place it on a rigid level surface. The location of the control panel, lid lock access hole, mains power switch and mains fuses are shown in Fig. 1A.

Check that the available power supply corresponds to that stated on the rating plate located at the rear of the instrument, (see Fig. 1B).

It is important that at least 75 mm ciearance is allowed at the sides and rear of the centrifuge when in final operating position, (see Fig. 2).

Connecting the power supply

220/240V **INSTRUMENT** - connect the 3-core cable to a 3-pin plug, fitted with a 5 Amp fuse (Mistral 1000) or a 7 Amp fuse (Mistral 2000), as follows:

Brown wire to Live (L) terminal
Blue wire to Neutral (N) terminal
Yellow/green wire to Earth (E) terminal

120V INSTRUMENT - supplied with fitted plug.

Restraint kit

A restraint kit, to secure the centrifuge to a sound work surface, is available. It consists of four anchor brackets, positioned at each corner of the machine base, which are bolted or screwed to the work surface, (see Fig. 3).

Accessories supplied with each centrifuge

Description		Quantity	FIS Part Number
Spare fuses M1000 120V/220V/240V		2	32600-066/063/063
M2000 120V/220V/240V		2	32600-066/064/064
Small electric screwdriver		2	78500-096
Allen key for lid removal		1	78500-006
Spindle nut		1	87120-204
Spare set of motor brushes	M1000 (220/240V)	1	34500-011
	M1000120V	1	61600-005
	M2000	1	34500-015
Guarantee card 120V/220V/240V		1	71100-944/941/941
Operating manual		1	71100-852

DO NOT ATTEMPT TO RUN THE CENTRIFUGE WITHOUT A ROTOR BEING FITTED TO THE DRIVE SHAFT. FAILURE TO COMPLY WITH THIS REQUIREMENT WILL CAUSE A 'TACHO SIGNAL LOSS' ERROR TO BE DISPLAYED. REFER TO TABLE 2, PAGE 22 IF THIS OCCURS.

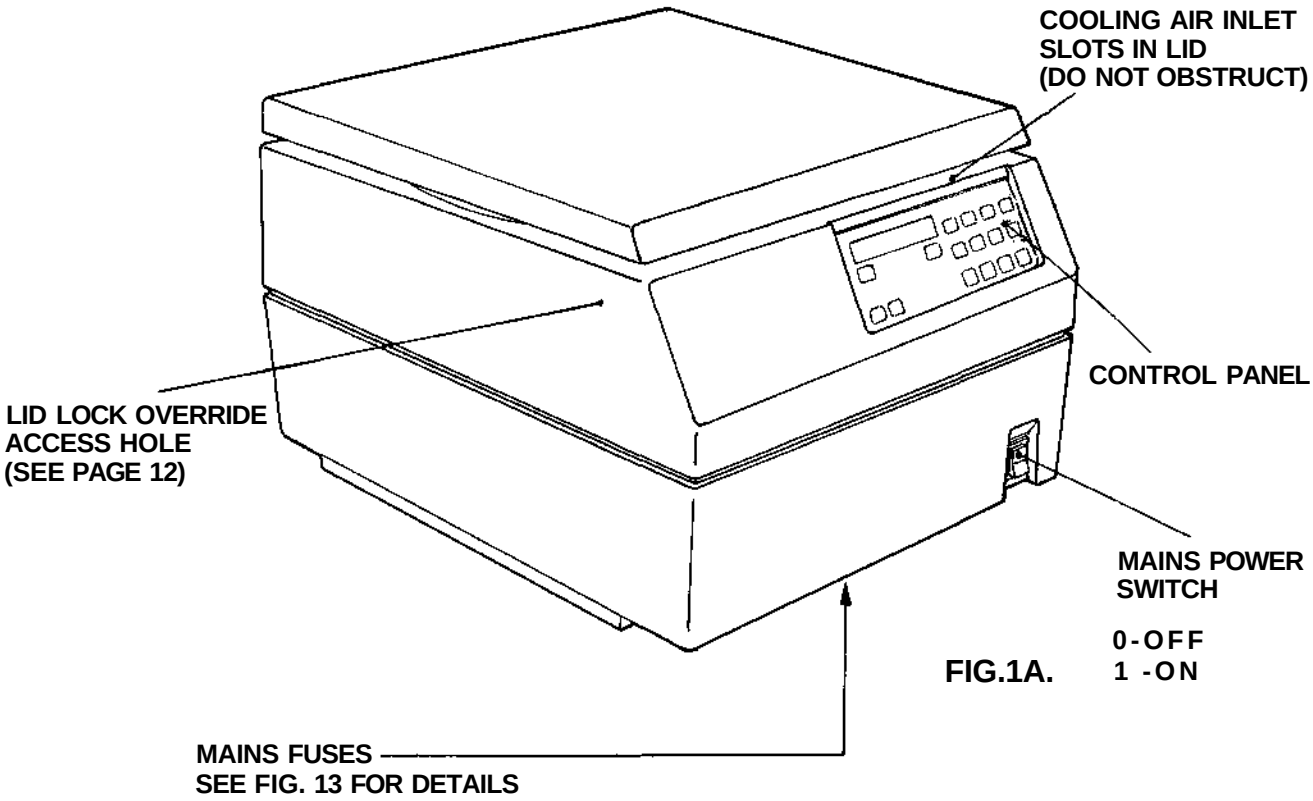


FIG.1A.

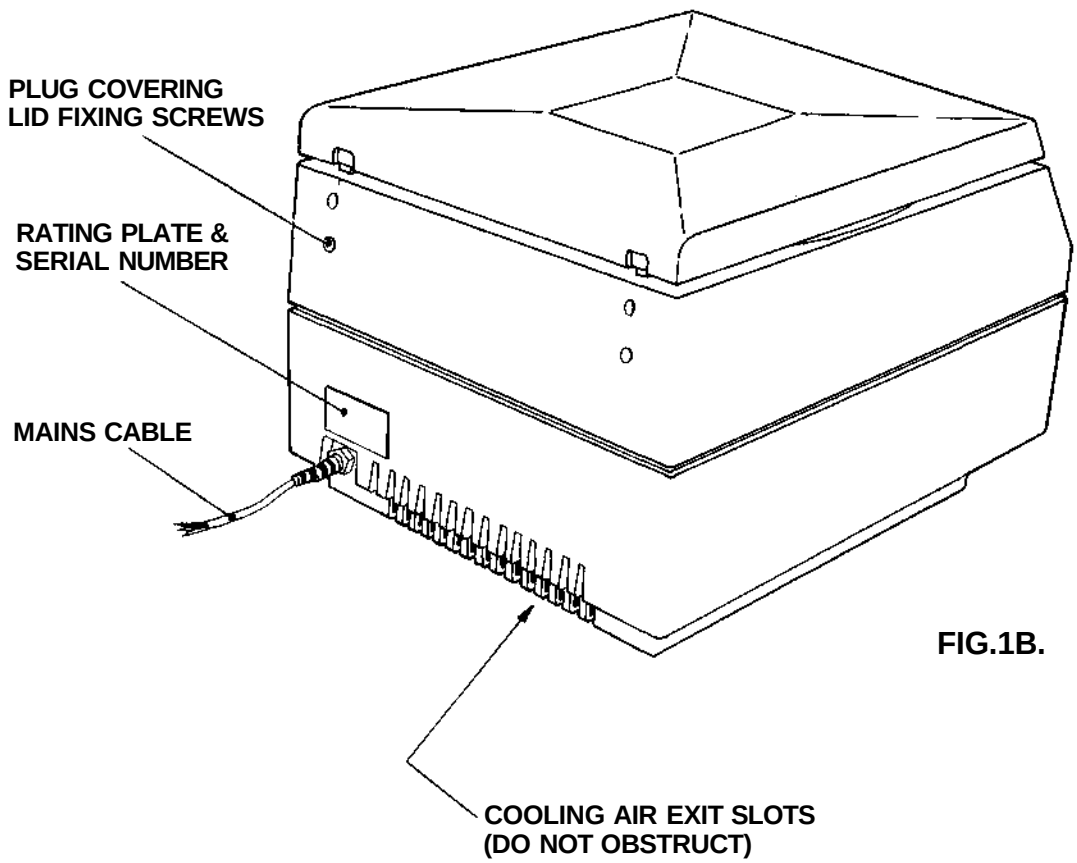


FIG.1B.

Fig. 1AandFig. 1B
FRONT AND REAR VIEWS OF THE CENTRIFUGE

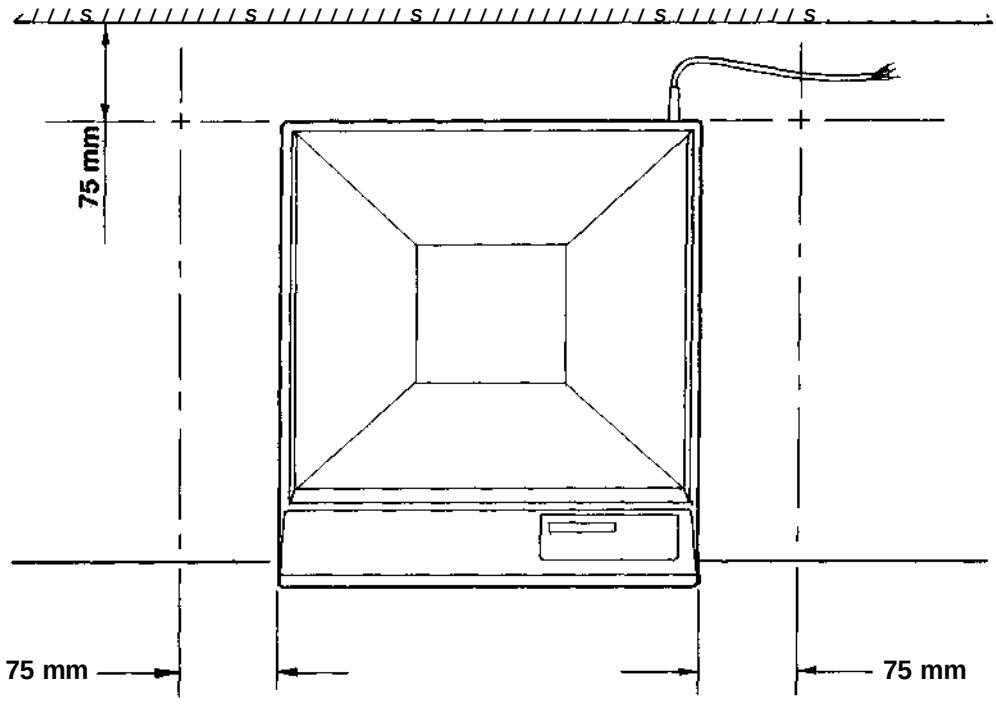
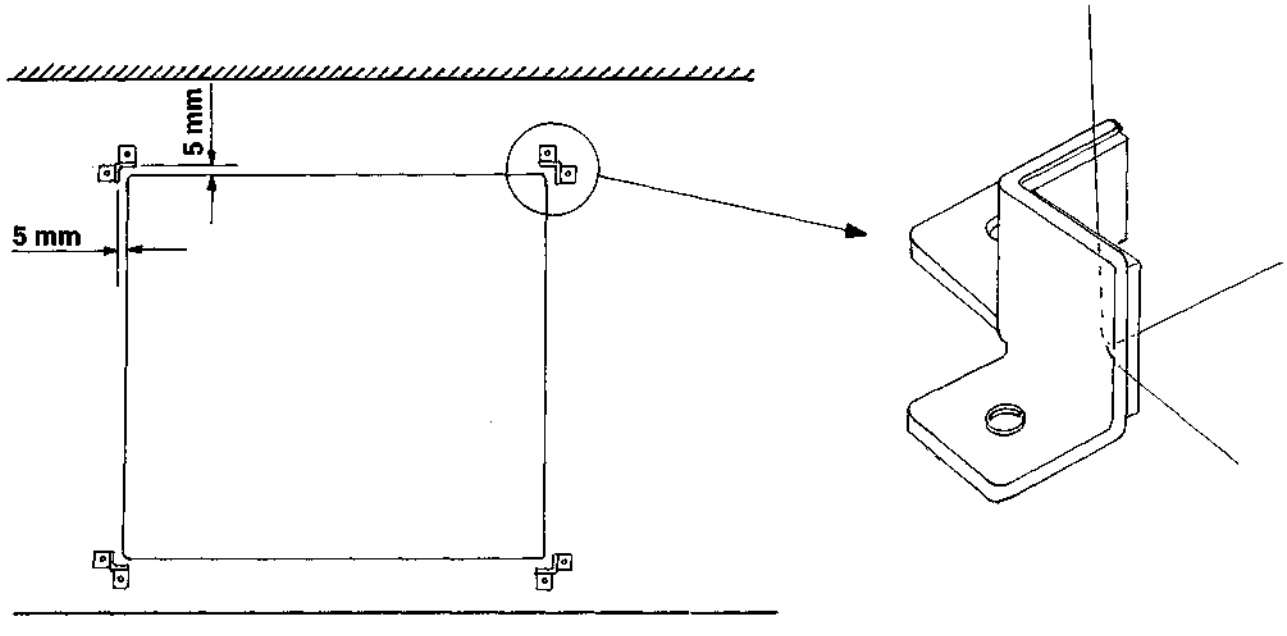


Fig. 2.
MINIMUM OPERATING CLEARANCES



A TEMPLATE IS SUPPLIED WITH THE BRACKETS TO AID ACCURATE POSITIONING ON THE BENCH

Fig. 3
SECURING THE CENTRIFUGE

4. Rotors and Accessories

Tables 3 to 13 on pages 24 to 34, give details of the range of rotors and accessories available for use on the Mistral 1000/2000 centrifuges. The drive head design and rotor identification system is common to both instruments.,The rotors are therefore interchangeable between the models, with the following exceptions:

IMPORTANT: - The 4 x 200 rotor (cat no 43124-134)
and
Microtitration rotor (cat no 43121 -117)
MUST NOT BE FITTED TO THE MISTRAL 1000.

Before fitting the rotor, ensure that the drive head and rotor bore are clean.

Fitting the rotor

Locate the rotor on the drive head and tighten spindle nut firmly by hand.To increase leverage, insert a suitable bar through the spindle nut central hole. DO NOT OVERTIGHTEN.

Loading the rotor

Buckets, cups and trunnions are supplied as matched, balanced assemblies. It is important that all components should be stored and used together. It is not necessary for all the buckets to be loaded, provided that the loads are placed symmetrically around the rotor.

THE ROTOR MUST ALWAYS BE USED WITH A FULL COMPLIMENT OF BUCKETS!

When using the angle rotors, ensure all the pockets are clean before fitting the buckets. When using the swing out rotor, ensure that the buckets swing freely about their pivots.

Refer to page 2 for centrifugation of samples with the following characteristics:

- Specific gravity in excess of 1.2.
- Corrosive materials.
- Infective samples.

Balancing the rotor

The loads should be reasonably balanced, which, in most cases, means equalising the liquid levels by eye. In the swing out rotor do not exceed 15g between loads when fully loaded, or 5g when partially loaded.

FAILURE TO LOAD THE ROTOR CAREFULLY WILL TRIP THE OUT OF BALANCE SENSOR, CAUSING THE INSTRUMENT TO STOP.

Removing the rotor

Open the lid and switch off the power. Remove all the buckets and trunnions. Unscrew and remove the spindle nut. Grip the rotor on opposite sides and gently rock the rotor from side to side a few times to release the rotor from the spindle. Lift the rotor clear of the drive head. NEVER USE EXCESSIVE FORCE.

NB - If the rotor has been left on the drive head for a prolonged period of use, removal of the spindle nut may be difficult. In this event, a suitable bar may be inserted through the hole in the spindle nut to obtain additional leverage.

5. How to Operate your Mistral 1000 and 2000 Centrifuges

Switching on

Connect to the power supply. Press the POWER ON switch at the front of the instrument, (0 = OFF, 1= ON). The switch will light up and you will hear an audible signal.

The key pad

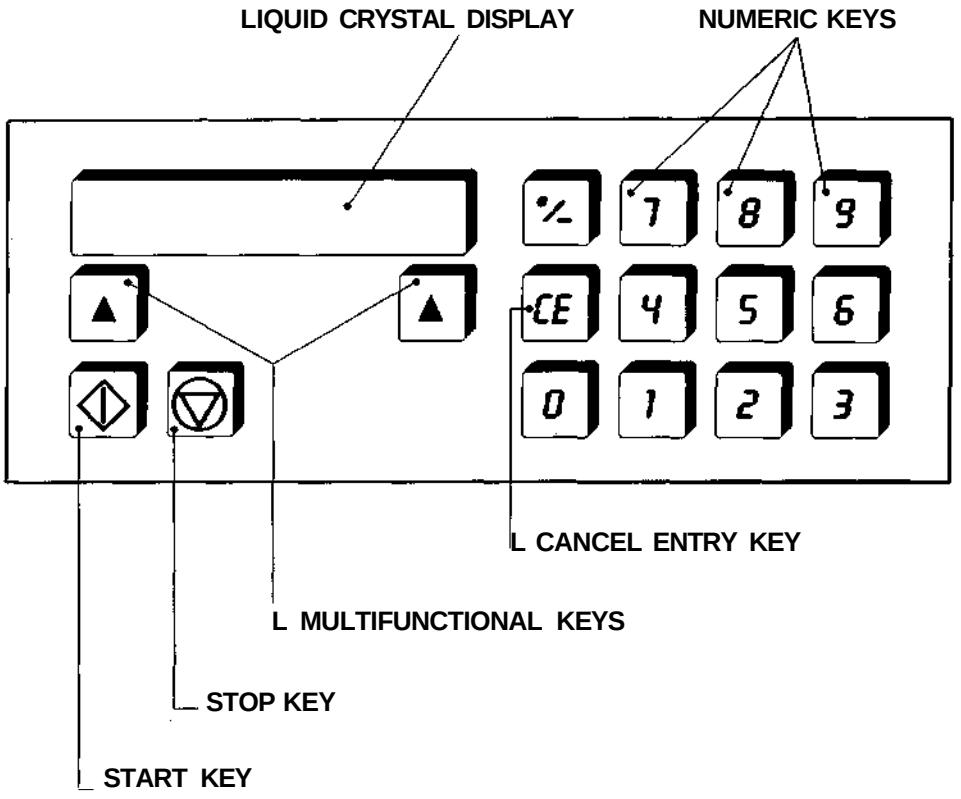


Fig.4
CONTROL PANEL AND DISPLAY

Understanding the control panel and display

The liquid crystal display shows two lines of information. (See Fig. 4)

Top line: PARAMETER DISPLAY LINE, ie Speed, Run time, Brake, RCF.
Bottom line: PROMPT LINE indicating options open to the operator.

In the event of a run error, an appropriate message will appear on the prompt line, together with an audible alarm.

Fig. 4 also shows that the key pad consists of several types of key:

(i) The ⏎ START and © STOP keys are used to initiate and terminate a run manually.

(ii) Beneath the liquid crystal display are two function keys marked with a triangle A. These are referred to as the LHK (left-hand key) and RHK (right-hand key). Their role is indicated by the messages on the prompt line.

(iii) The numeric keys are used to enter values for speed, g, time etc.

6. Opening the Lid

Switching on

Connect the power supply and press the POWER ON switch. The POWER ON switch is illuminated green when activated.

The liquid crystal display will become active and an audible signal informs the user that the instrument is ready for use.

The display will settle to that shown in Fig. 5. The instrument is equipped with battery back-up and, on power up, will display the values current when the instrument was last switched off. The top line may therefore differ from that illustrated in Fig. 5.

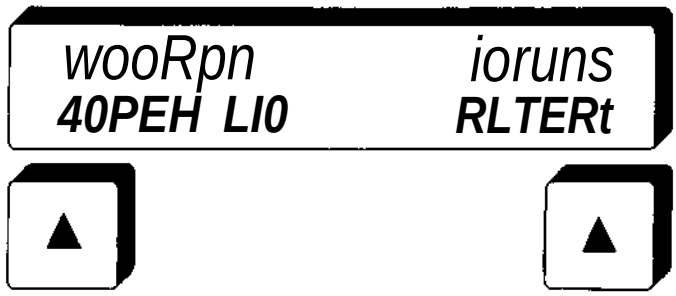


Fig. 5
DISPLAY ON POWER-UP

THE INSTRUMENT NOW AWAITS YOUR INSTRUCTIONS

Opening the lid

To open the lid, press the LHK A indicated by 'OPEN LID' on the prompt line. The display wilf ŕïüw change to that shown in Fig. 6.

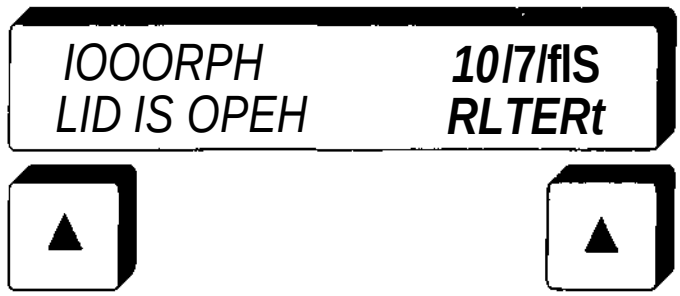


Fig. 6

The lid is counter-balanced and will remain open in any position.

Load the rotor and buckets as described on page 6.

Close the lid and press firmly down to engage the lid lock.

7. Parameter Entry

Upon closing the lid, the display will revert to that shown in Fig. 5. To start the machine using the current parameters shown on the top display line, press ⏀ (START).

To alter the parameters press RHK A indicated by 'ALTER' on the prompt line. The display will change to that shown in either Fig. 7 or Fig. 8. The operator can now enter speed or RCF(g). To move between speed and RCF(g) press the LHK • indicated by 'RPM/G' on the prompt line.

Entering speed

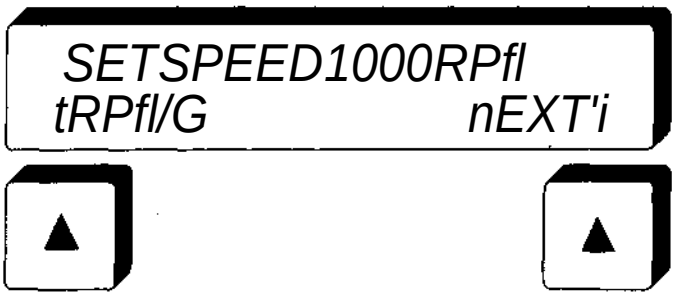


Fig. 7

The currently selected speed is displayed. A new speed may be entered, using the numeric keys, within the range of 200 to 6500 rpm. If a mistake is made, simply press CE. The display will revert to the previous speed, the new speed may now be re-entered.

Entering an RCF value

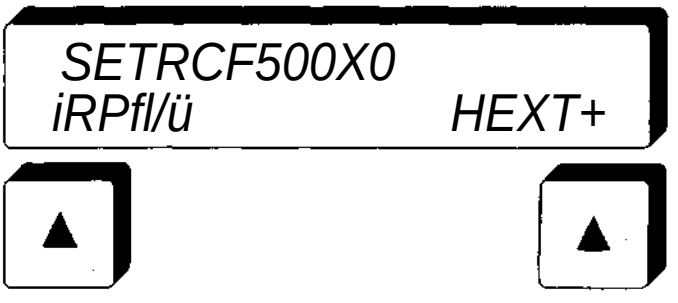


Fig. 8

The currently selected RCF is displayed. A new RCF value may be entered using the numeric keys. If a mistake is made, press CE. The display will revertto the previous speed, the new speed may now be re-entered. The microprocessor will calculate and set the speed to achieve the RCF value set.

To alter the next parameter, press the RHK A indicated by the 'NEXT' prompt.

NB - Each rotor has a maximum speed (or RCF value). If the operator selects a value in excess of this, the automatic rotor identification system will reduce the value to the maximum limit.

Entering run time

The display will change to that shown in Fig. 9.

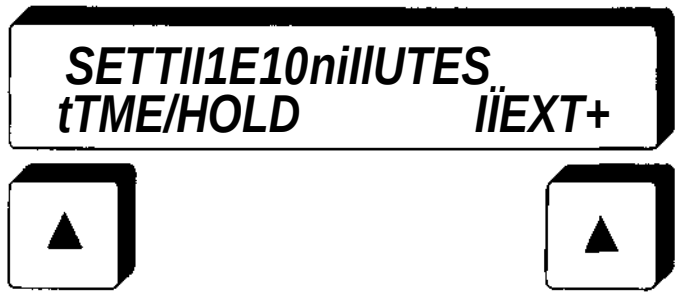


***Fig.** 9*

The current run time is displayed and may be altered within the following ranges: 0-9.9 minutes and 10-99 minutes, using the numeric key pad. During the run, the time remaining will be displayed.

If time hold is required, press the LHK A indicated by the prompt 'TIME/HOLD'. In this case, the time elapsed from the start of the run is indicated.

To alter the next parameter press the RHK A indicated by the 'NEXT' prompt.

Entering a brake rate

The display will now change to that shown in Fig. 10.

***Fig.** 10*

The current brake rate is displayed and may be altered using the numeric key pad. Brake rate may be entered within the range of 0 to 3, where

0 = brake off
1 = minimum brake
2 = medium brake
3 = maximum brake

To display new values, press the RHK A indicated by the prompt 'NEXT'.

8. Starting the Run

Ensure that the rotor is correctly loaded and fitted. Close the lid and press down firmly to engage the lid lock. Press ◁▷ (START).

The display will now change to show actual values of speed and run time. After a short delay the motor will engage.

Fig. 11 shows a typical display during the run. The run status of the machine is indicated by the messages RUNNING or AT SPEED or STOPPING. This is displayed intermittantly with the SHOW SET message.

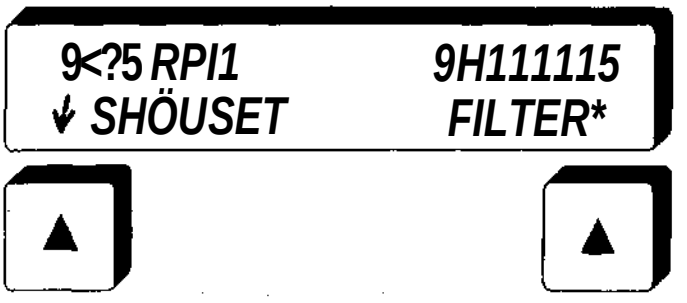


Fig. 11

Examination of set values

During the run it is possible to examine the set values by pressing the LHK • indicated by the 'SHOW SET' prompt. The values will display for a few seconds and then the display will revert to actual values.

Please note that the brake rate value is not displayed.

Altering run parameters whilst the centrifuge is running

Whilst the 'ALTER' prompt is indicated, run parameters can be changed by pressing the RHK A and following the procedure previously outlined. The instrument will respond to the new values immediately.

Manual termination of run

At any time the run may be stopped by pressing the © (STOP) button.

9, Error Conditions

Error messages

Any error message is intermittentiy displayed on the bottom line of the display, as indicated in Fig. 12. The display is accompanied by an audible alarm.

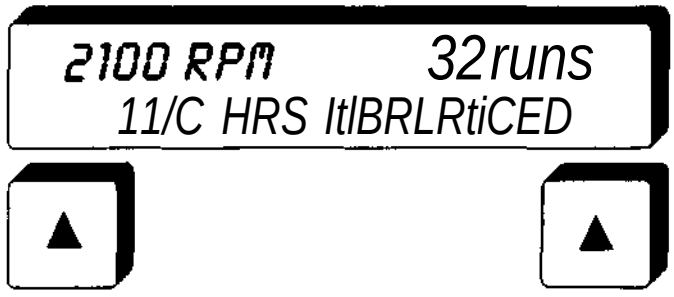


Fig.12

Please refer to Table 2 on page 21 for a full explanation of each message and the correct course of action.

Emergency lid release

It is not possible to open the lid via the keypad if there is a power failure or if the lid lock has been deliberately disabled by the control system for safety reasons. (See Table 2).

DISCONNECT THE POWER SUPPLY BEFORE PROCEEDING FURTHER

To open the lid under these conditions, the lid lock must be over-ridden using the small electrical screwdriver supplied in the accessories kit.

Referring to Fig. 1A, insert the lid release tooi into the hole shown and gently push in until the lid opens.

WARNING: THE ROTOR MAY BE STILL TURNING!

ALLOW THE ROTOR TO STOP.

DO NOT TOUCH THE ROTOR UNTIL IT IS AT REST.

The lid cannot be shut whilst the power is off. To shut the lid, insert the lid release tooi as above and hold in. Press the lid down firmly, and simultaneously remove the tooi.

Motor Thermal Cut Out

The drive motor is fitted with a thermal cut out to prevent damage to the motor windings in the event of overheating.

Should this occur during a run, the power supply to the motor will be disconnected, and the error message LOSS OF DRIVE will be displayed. (Refer to Table 2 on page 22).

DO NOT ATTEMPT TO RESTART THE INSTRUMENT UNTIL IT HAS BEEN CHECKED BY A QUALIFIED PERSON.

The thermal cut out will automatically reset when the motor has cooled down.

10. Maintenance

This section describes the basic maintenance procedures, in particular, the methods and materials used for cleaning the centrifuge, rotors and accessories.

Cleanliness

To maintain a good appearance and to prevent dirt build-up, the casing and the inside of the bowl shouid be cleaned regularly using a soft cloth dampened with a neutral detergent and warm water. The key pad and display may also be cleaned in this manner, but shouid be wiped dry immediately.

If corrosive materials are used in the centrifuge, it is especially important to clean out the centrifuge bowl thoroughly. Pay particular attention to the cooling air louvres. If a major spillage occurs in the bowl, the excess liquid shouid be mopped out and the bowl then removed for final cleaning (refer to page 16 for bowl removal procedure).

Drive shaft

The drive shaft shouid be cleaned periodically with a solvent to remove excessive grease. When clean, re-lubricate the shaft lightly with petroleum jelly.

Rotors and buckets

The rotors and accessories shouid be handled with care to avoid damage. Prior to storage, all components shouid be protected against corrosion using MSE Rotor Spray (Cat No 17341-151) which is an anti-corrosion and de-waterizing agent.

The rotors, metal buckets, cups, carriers and adaptors shouid all be washed after use with a neutral detergent and afterwards dried and stored in a dry place. Buckets and cups shouid be stored inverted.

The pivot areas of the swing-out rotors, i.e. the pivot pins on the rotor and the slots on the buckets, shouid be lubricated periodically with Molykote 321 R grease (a spray can is the most convenient application method).

0-Rings

Ensure that the 0-Rings fitted to the sealing caps are lightly coated with silicone grease. Check the 0-Rings regularly for cuts and abrasions, replacing as necessary but at least once a year.

Lid friction block adjustment

Mistral 2000 only - In the event that the lid fails to lift off its catch when the open lid key is depressed then it is most probable that the lid friction block needs adjustment. Open the lid manually (see page 12), then turn clockwise the small socket screw, which is visible through the small hole that is located on the underside of the lid towards the centre-rear of the machine. A key is supplied with the machine for this purpose.

Sterilisation

All of the rotors, buckets and sealing caps (with O-Rings removed) and the bowl may be sterilised by autoclaving at 120°C, (see page 16 for bowl removal procedure).

If the means available for disinfection of certain microbiological agents are inadequate, the safety officer should be consulted and appropriate steps taken.

Lid seal

Lightly coat the lid seal with French chalk occasionally and in particular after cleaning.

If the lip of the lid seal becomes damaged it should be replaced by following the procedure for removing and re-fitting the bowl, (see page 16).

TO BE CARRIED OUT BY QUALIFIED PERSONNEL ONLY.

Replacing the fuse

The main power supply incorporatesa fuse protection on both the live and neutral connections, the locations of the fuse holders are shown in Fig. 13. The main connection plug on the 220V/240V instrument should also be fitted with a fuse.

Table 1 gives the fuse ratings for each machine:

Table 1
Fuse Ratings

	120V	220V/240V	Plug 220V/240V
Mistral 1000	T10.0A	T3.15A	5.0A
Mistral 2000	T10.0A	T5.0A	7.0A

If one or both of the fuses have blown, and the machine is switched on, the display will not function and the lamp in the Power On switch will not light up.

To replace the instrument fuse proceed as follows:

(i) Disconnect the power supply at the main plug.

(ii) Move the instrument until the front protrudes over the bench edge, (see Fig. 13).

(iii) Unscrew the fuse holder caps and remove the fuses. Inspect and replace as necessary with the correct rating. For 220V/240V model, the plug fuse may also need to be checked.

(iv) Reposition the machine and connect the power supply.

NB - If the fuse blows immediately or blows again during normal use, the power supply should be disconnected and the service engineer called.

Additional fuses are located internally on the P.C.B. - ratings as follows:-

		120V	220/240V
Mistral 1000/2000	FS1	T250mA	T100mA
	FS2	T1.0A.	T315mA

If failure of a P.C.B, fuse is suspected, contact your service engineer.

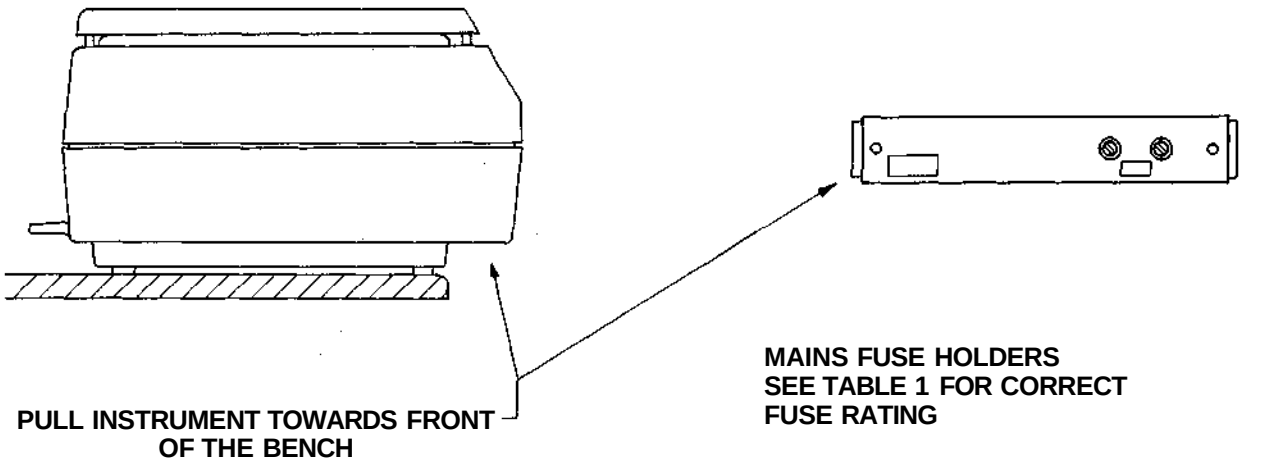


Fig.13
MAINSFUSEACCESSANDREPLACEMENT

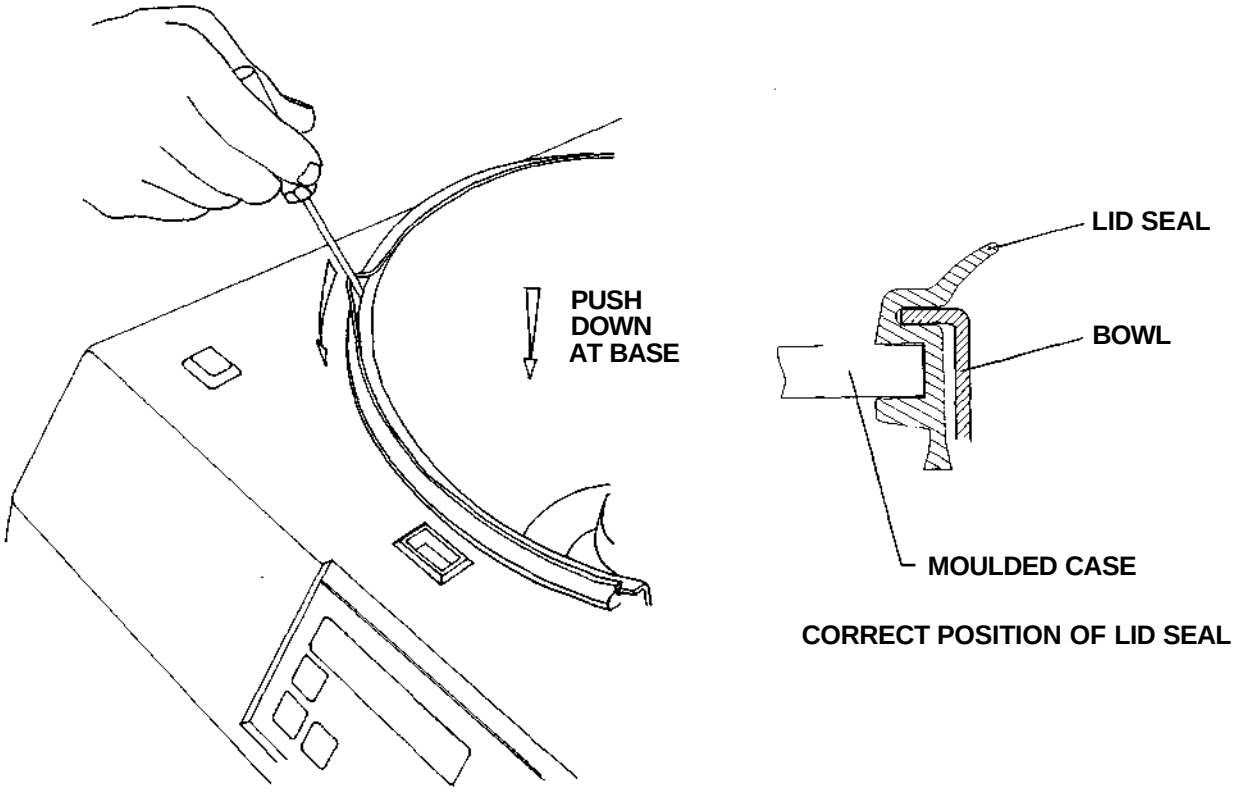


Fig.14
REFITTINGTHEBOWL

Removing and re-fitting the bowl

TO BE CARRIED OUT BY QUALIFIED PERSONNEL ONLY.

To remove the bowl for cleaning or stenlisation, proceed as follows:

(i) Open the lid, disconnect the power supply and remove the rotor assembly.

(ii) Turn the machine around and remove the four hole-blanking plugs covering the lid fixing screws, (see Fig. 1B). With the lid fully open (vertical), remove the screws using the M5 Allen key provided and lift the lid assembly clear.

(iii) Using the air louvres as grip (situated on the inside front face of the bowl), pull upwards and release the top flange of the bowl from the lid seal recess.

(iv) Next, push the skirt of the rubber motor gaiter in and down and obtain a finger grip under the inner run of the bowl. Starting at the front where the bowl flange is already free, work around the bowl circumference, easing back the seal whilst **puiling** upwards at the centre of the bowl. Once the top flange of the bowl is free of the lid seal, lift the bowl out squarely.

To replace the bowl proceed as follows:

(i) Inspect the lip of the lid seal and replace if necessary. Refit the lid seal with the two ends closely butted together and with the join to the rear. Check that the motor gaiter is seated correctly with the air inlet slots flush with the metal base.

(ii) Fit the bowl, positioning the louvres at the front of instrument. This operation may be aided by applying French chalk to the lid seal and rotating the bowl from side to side as it is pushed down. Using the screwdriver blade, hook the lid seal lip outwards at a convenient point, applying downwards pressure while working the bowl flange into the seal recess, (see Fig. 14).

(iii) Hook the motor gaiter back in position to seal around the bowl inner rim. Check that the top end of the gaiter is correctly fitted on to the top moulding.

(iv) Re-fit the lid in the opposite sequence to removal. Re-connect the power supply and open and close the lid a few times to check correct operation.

Replacing the motorbrushes

TO BE CARRIED OUT BY QUALIFIED PERSONNEL ONLY.

(i) Open the lid, disconnect the power supply and remove the rotor assembly. Remove the bowl as described earlier, (see page 16).

(ii) Pinch the top section of the rubber motor gaiter and pull up and over the plastic moulding.

NB - Do not pull the gaiter up more than is necessary to gain access with a 'Posidrive' screwdriver as shown in Fig. 15A.

(iii) Viewing around the side of the motor, the heads of the three clamping screws securing the motor assembly to the base moulding are clearly visible. Unscrew each one by approximately 5 turns and use the end of the screwdriver to swivel the damp plate through 90°.

(iv) Note the orientation of the motor assembly and then tilt to one side and lift out through the hole.

It is not necessary to unplug the main harness or to disconnect the earth lead.

(v) With reference to Fig. 15B, remove the old brushes, noting carefully the relationship between the components.

The area in the vicinity of the brush housing must be completely cleared of carbon dust. Use airline or similar to blow area clear.

Fit the new set of brushes, ensuring that they move freely within the carrier and that the spring is effective. **Important:** The pigtails of the 120V Mistral 1000 motor brushes must be coiled behind the spring as shown. When fitting this brush assembly to the motor the pigtail must be located in the groove of the brush housing, ensuring that the pigtail is not trapped between the housing and carrier.

(vi) Re-locate the motor assembly in the same orientation as previously noted. Check that the wiring harness, and in particular the earth lead, is not trapped under the motor mount plate.

Swivel the damp plates back into position and lightly tighten each damp screw. Finally tighten each screw to a torque setting of 2.3 Nm (20lb in).

Re-position the motor gaiter and replace the bowl and lid as described earlier, (see page 16).

(vii) Run the centrifuge with an unloaded rotor (with a full complement of buckets) for half an hour at 1000 rpm to bed in the brushes.

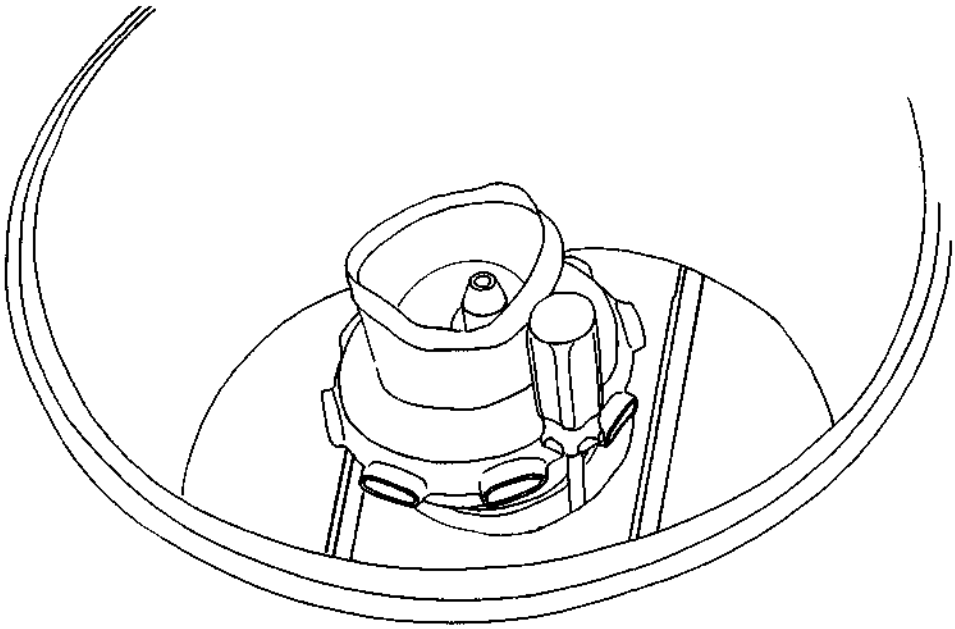


Fig. 15A
REMOVING THE MOTOR ASSEMBLY

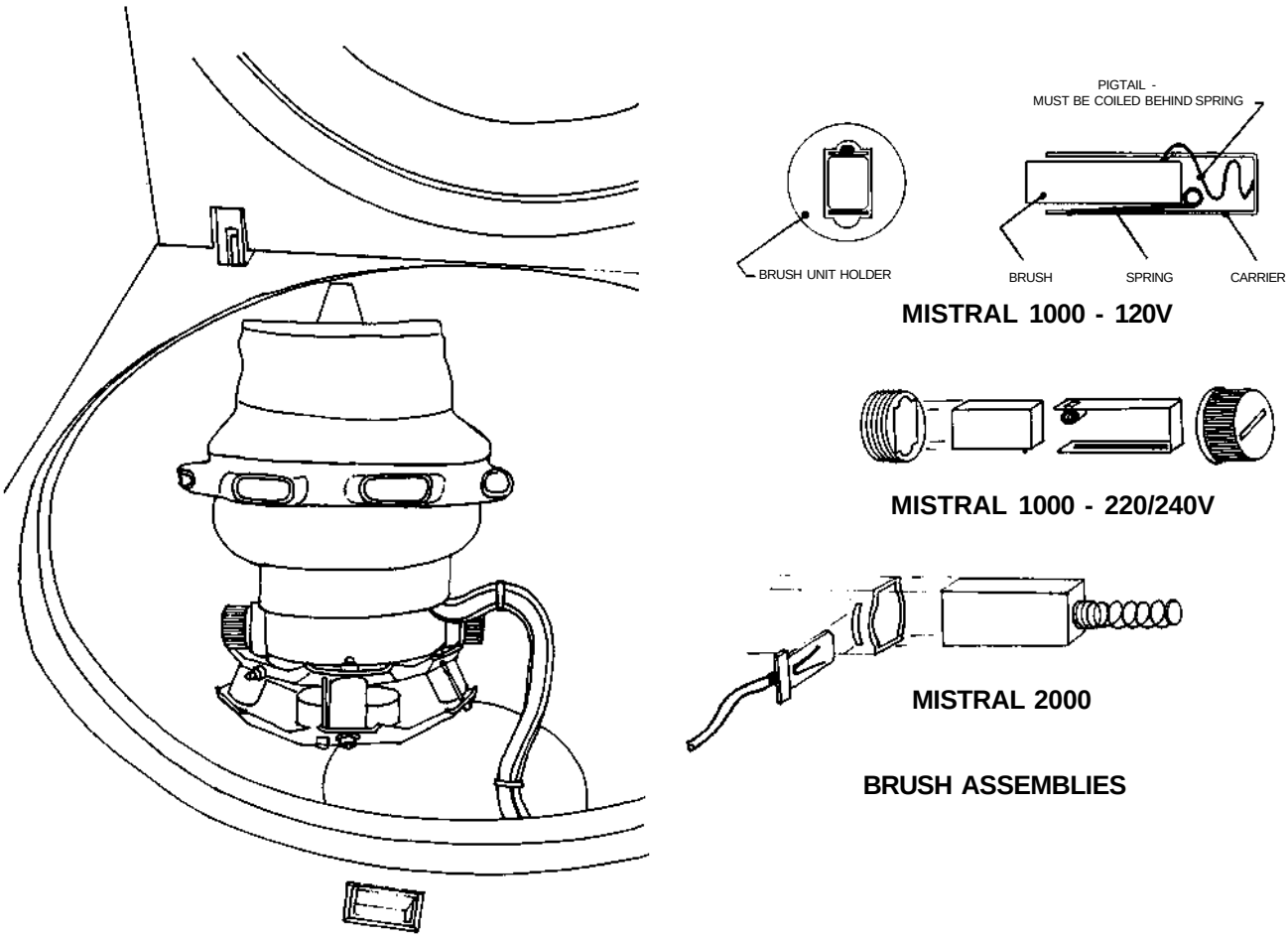


Fig. 15B
REPLACING THE MOTOR BRUSHES

It is recommended that a regular inspection is made (after each 250 hours of operation time or every 6 months, whichever is the sooner) of the centrifuge, inciuding rotors and accessories, to ensure reliability and safety.

For service information contact:

(Under guarantee):

Sanyo Gallenkamp PLC,
Technical Sales Support,
Bishop Meadow Road,
Loughborough,
Leicestershire.
LE11 ORG
Tel: (0509) 237371

(Out of guarantee):

Fisons Instruments,
Sussex Manor Park,
Gatwick Road,
CRAWLEY,
West Sussex.
RH10 2QQ
England.
Tel: (0293) 561222
Fax:(0293)561980

Users abroad should contact their local MSE distributor or, if there is no distributor, contact MSE direct.

11. Specifications

	MISTRAL 1000	MISTRAL 2000
Power Supply options	120V 50/60Hz single phase 220V 50/60Hz single phase 240V 50/60Hz single phase	
Power consumption at full load, (Acceleration Power shown in brackets)	120V- 550 watts (1000) 220V - 650 watts (1100) 240V - 600 watts (1000)	600 watts (1000) 700 watts (1300) 700 watts (1300)
Speed range	200-6000 rpm	200-6500rpm
RCF range	5-4750	5-5575
Speed control accuracy	± 10 rpm	
Speed display	± 25 rpm	
Timing accuracy	0.1 second	
Timing display range	0-9.9 minutes 10-99 minutes	

Instrument specification:

- height (mm)	335	335
- width (mm)	405	470
- depth (mm)	502	550
-weight(kg)	34	43

The instruments are designed to comply with the following standards:

BS 4402 (D)-(1982)	- Safety Requirements for Laboratory Centrifuges. Compliance is with respect to mechanical containment.
ESCHLE2ndEdition(1986)	- Electrical Safety Code for Hospital and Laboratory Equipment.
BS 800 (1983)	- Specification for Radio-Interference Limits.

INDEPENDENT SPEED SENSING

120 volt Machines only

To comply with certain USA standards the 120 volt machines are fitted with a small window through the cover. This permits independent speed calibration directly from the rotor with the use of a suitable stroboscopic light source.

Note: Machines fitted with this window do not comply with the requirements laid down in BS 4402.

12. Explanation of Error Messages

TABLE2

Explanation of Error Messages

Note 1: In the event that the lid cannot be opened electronically, open it manually (see page 12), power up and press CE.
Note 2:If an error is not rectified by taking the suggested action, or if it is erratic or persists without apparent cause, disconnect the power supply and contact the service engineer.

ERROR MESSAGE	EXPLANATION	EFFECT ON MACHINE OPERATION	OPERATOR ACTION
Data loss	Data loss	Machine will not run or will stop.	1. Re-enter run data. 2. Check motor brushes (Refer to Section 10, Page 17) and replace if necessary.
Data corruption	Data corruption	Data will be re-set automatically and the Machine will continue to run normally.	None.
Data too long Data too high Data too low	Entered data is not within allowable range.	None.	Refer to Section 7 on page 7 for allowable range. Press CE and enter correct value.
Bad rotor ID	Rotor has not been correctly identified.	Machine will stop. Error cannot be cancelled until rotor has stopped turning.	1. Press CE and open the lid. 2. Remove rotor, clean drive head and top surface of motor. Clean and inspect rotor bore and underside of rotor. Check magnets are not missing or damaged. 3. Check circuit function by fitting a different rotor.

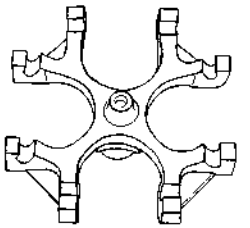
TABLE 2 (continued)

ERROR MESSAGE	EXPLANATION	EFFECT ON MACHINE OPERATION	OPERATOR ACTION
Tacho signal loss	No speed signal feedback.	Machine will stop. Lid Lock disabled preventing normal lid operation.	1. Wait for 3 minutes or until you are sure the rotor has stopped turning. Follow "Emergency Lid Release" procedure on page 12 to open the lid. (SEE NQTE 1).
Tacho signal erratic	Fault in tacho signal.		2. Check that a rotor is fittéd. 3. Perform similar action as for "Bad Rotor Identification" above. 4. Check motor brushes (Refer to Section 10, Page 17) and replace if necessary.
Machine is overspeeding	The machine speed is exceeding the maximum speed of the rotor fitted by > 300 rpm.	Machine will stop. Lid Lock disabled preventing normal lid operation.	Disconnect power supply and do not use the machine further until checked by a service engineer.
Machine has imbalanced	Rotor assembly is not balanced within allowable limits.	Machine will stop. Error cannot be cancelled until the rotor has stopped turning.	1. Press CE and open the lid. 2. Inspect rotor buckets and load and rectify imbalance. 3. Remove rotor and clean drive head and rotor bore.

TABLE 2 (continued)

ERROR MESSAGE	EXPLANATION	EFFECT ON MACHINE OPERATION	OPERATOR ACTION
Loss of Drive	Speed is reducing at a time when the control system is calling for acceleration or constant speed.	Machine will stop. Lid Lock disabled preventing normal lid operation.	1. Check that the cooling airflow is not obstructed. (Refer to figures 1A, 1B and 2). A qualified person should check that the motor gaiter is fitted correctly. Allow motor to cool before re-starting the instrument (SEE NOTE 1). 2. Check motor brushes (Refer to Section 10, Page 17) and replace if necessary.
Brake error	Fault in braking circuit or running rotor without load or buckets.	Machine will stop. Lid Lock disabled preventing normal lid operation.	Follow instructions in Note 1, if problem persists, disconnect power supply and do not use the machine further until checked by a service engineer.
Lid is open/unlocked	Malfunction of lid lock mechanism or interlock switches during operation.	Machine will stop.	Disconnect power supply and do not use the machine further until checked by a service engineer.
System Error No Zero-cross signal	Major hardware fault.	Machine will not run or will stop.	Switch power supply off and on again.

TABLE 3
4 x 100 SWING OUT ROTOR (MSE 43121-302).3600 R.P.M. (MAX SPEED)

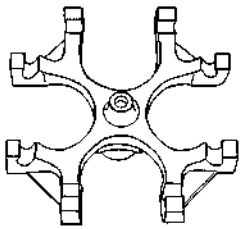


ACCESSORIES
100ml TRUNNION (34134-611), 100ml SHORT BUCKET (34411 -912)
SEALED CAP ASSEM BLY (MSE 43561 -607. CLEAR PLASTIC)

ADAPTOR			TUBE	CAP	CUSHION	SEALED BUCKET		OPEN BUCKET		MAX TUBE SIZE	
CAPACITY	COLOUR	CAT. NO.				RADIUS (MM)	RCFxg	RADIUS (MM)	RCFxg	DIA (MM)	LENGTH (MM)
4x100ml			100mlGlass MSE 34411-839		34142-105	151	2188*	154	2231*	41	118
				34431-406				154	2231*	41	118
			100ml POLYPROPYLENE 34411-166			158	2289	161	2332	41	122
				34431-606				161	2332	41	122
4x50ml	RED	MSE 43155-145	50ml GLASS 34411-822	34431-403		155	2245	158	2289	29	120
			50ml POLYPROPYLENE 34411-154	34431-605		155	2245	158	2289	29	120
			50ml POLYCARBONATE 34411-158	34431-605		155	2245	158	2289	29	120
			50ml GLASS CONICAL 34411-818	34431-403	34148-705	144	2086	147	2129	29	112
			50ml GLASS GRADUATED 34411-821	34431-403		155	2245	158	2289	29	120

*CHECK WITH THE TUBE SUPPLIER ON THE MAX RCFxg VALUE

TABLE 4
4 x 100 SWING OUT ROTOR (MSE 43121-302).3600 R.P.M. (MAX SPEED)

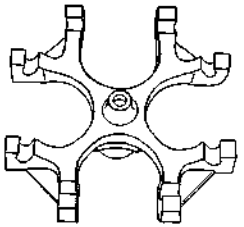


ACCESSORIES
10Oml TRUNNION (34134-611), 100ML SHORT BUCKET (34411 -912)
SEALED CAP ASSEMBLY (MSE 43561-607. CLEAR PLASTIC)

ADAPTOR			TUBE	CAP	CUSHION	SEALED BUCKET		OPEN BUCKET		MAX TUBE SIZE	
CAPACITY	COLOUR	CAT. NO.				RADIUS (MM)	RCFxg	RADIUS (MM)	RCFxg	DIA (MM)	LENGTH (MM)
4 X 15 ml	GREEN	MSE 43155-146	15mlGLASS 34411-815	34431-402		157	2274	160	2318	17	126
8 x 15 ml						147	2129	150	2173	17	114
4 x 15ml			15ml POLYPROPYLENE 34411-131	34431-603		156	2260	159	2304	17	126
8 x 15 ml						146	2115	149	2158	17	110
4 x 15 ml			15ml POLYCARBONATE 34411-133	34431-603		156	2260	159	2304	17	126
8 x 15 ml						146	2115	149	2158	17	110
4 x 15 ml			15mlGLASS CONICAL 34411-813	34431-402	43161-103	148	2145*	151	2188*	17	118
8 x 15 ml								141	2042*	17	110
4 x 15 ml			15mlGLASS CONICAL GRADUATED 34411-814	34431-402	43161-103	148	2145*	151	2188*	17	118
8 x 15ml								141	2042*	17	110

*CHECK WITH THE TUBE SUPPLIER ON THE MAX RCFxg VALUE

TABLE 5
4 x 100 SWING OUT ROTOR (MSE 43121-302).3600 R.P.M. (MAX SPEED)

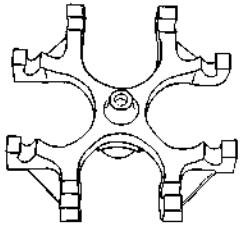


ACCESSORIES
10Oml TRUNNION (34134-611), 10OML SHORT BUCKET (34411 -912)
SEALED CAP ASSEMBLY (MSE 43561-607. CLEAR PLASTIC)

ADAPTOR			TUBE	CAP	CUSHION	SEALED BUCKET		OPEN BUCKET		MAX TUBE SIZE	
CAPACITY	COLOUR	CAT. NO.				RADIUS (MM)	RCFxg	RADIUS (MM)	RCFxg	DIA (MM)	LENGTH (MM)
4 x	YELLOW	MSE 43155-147	STERELIN			148	2145	151	2188	30	117
			FALCON			157	2274	160	2318	30	123
			1OZ PLASTIC			149	2158	152	2202	30	118
			1OZGLASS			149	2158*	152	2202*	30	118
8 x	GREY	MSE 43155-148	Z5			140	2029	143	2072	16.5	105
			Z10			140	2029	143	2072	16.5	105
20 x 5 ml	BLUE	MSE 43155-149	5 ml			148	2145	151	2188	12	113
20 x 7 ml			7 ml			148	2145	151	2188	12	113

*CHECK WITH THE TUBE SUPPLIER ON THE MAX RCFxg VALUE

TABLE 6
4 x 100 SWING OUT ROTOR (MSE 43121-302).3600 R.P.M. (MAX SPEED)

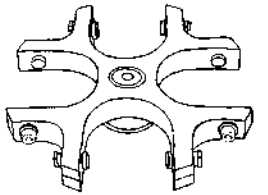


ACCESSORIES
4 PLACE 15ml TRUNNION (34136-103), 15ml SPHERICAL END BUCKET (MSE 43156-601)

ADAPTOR			TUBE	CAP	CUSHION	SEALED BUCKET		OPEN BUCKET		MAX TUBE SIZE	
CAPACITY	COLOUR	CAT. NO.				RADIUS (MM)	RCFxg	RADIUS (MM)	RCFxg	DIA (MM)	LENGTH (MM)
16 x 15ml			15mlGLASS 34411-815	34431-402	34142-101			146	2115*	17	108
			15ml POLYPROPYLENE 34411-131	34431-603				151	2188	17	115
			15ml POLYCARBONATE 34411-133	34431-603				151	2188	17	115
			15mlGLASS CONICAL 34411-813	34431-402	43161-103			146	2115*	17	108
			15mlGLASS CONICAL GRADUATED 34411-814	34431-402	43161-103			146	2115*	17	108

*CHECK WITH THE TUBE SUPPLIER ON THE MAX RCFxg VALUE

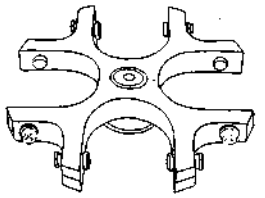
TABLE 7
4 x 200 SWING OUT ROTOR (MSE 43124-134). 4500 R.P.M. (MAX SPEED)
(USED IN MISTRAL 2000)



ACCESSORIES
200ml SEALED BUCKET (43551-121)

ADAPTOR			TUBE	CAP	CUSHION	SEALED BUCKET		OPEN BUCKET		MAX TUBE SIZE	
CAPACITY	COLOUR	CAT. NO.				RADIUS (MM)	RCFxg	RADIUS (MM)	RCFxg	DIA (MM)	LENGTH (MM)
4 x 200ml			200ml BOTTLE 43551-103			160.4	3631			57.7	120.2
4 x 100ml	BROWN	34159-302				160.5	3637			39	113
4 x 50/1OZ	YELLOW	34159-301				160.5	3637			29	113
28 x 15ml	GREEN	34159-304				160.5	3637			17	110
28 x 15ml	BLACK	MSE 34159-308				158	3577			17	107
16x5/10ml	GREY	34159-303				159	3600			16.7	105
48 x 12mm	BLUE	34159-306				160.5	3637			12	110
36 x 13mm	ORANGE	34159-305				160	3622			13	110

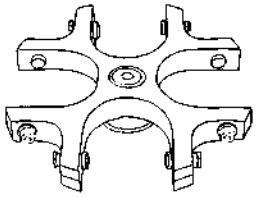
TABLE 8
4 x 200 SWING OUT ROTOR (MSE 43124-134). 4500 R.P.M. (MAX SPEED)
(USED IN MISTRAL 2000)



ACCESSORIES
4 x 50ml UNIVERSAL BUCKET (43551-125)

ADAPTOR			TUBE	CAP	CUSHION	SEALED BUCKET		OPEN BUCKET		MAX TUBE SIZE	
CAPACITY	COLOUR	CAT. NO.				RADIUS (MM)	RCFxg	RADIUS (MM)	RCFxg	DIA (MM)	LENGTH (MM)
16 x 50ml			50ml UNIVERSAL					146	3305	28	95

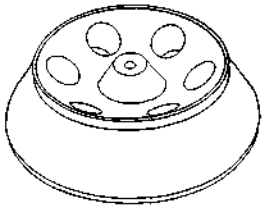
TABLE 9
4 x 200 SWING OUT ROTOR (MSE 43124-134). 4500 R.P.M. (MAX SPEED)
(USED IN MISTRAL 2000)



ACCESSORIES
2-PLACE 50ml TRUNNION (34136-109)
50ml SPHERICAL END BUCKET (MSE 43156-602) SEALED CAP ASSEMBLY (43561-162)

ADAPTOR			TUBE	CAP	CUSHION	SEALED BUCKET		OPEN BUCKET		MAX TUBE SIZE	
CAPACITY	COLOUR	CAT. NO.				RADIUS (MM)	RCFxg	RADIUS (MM)	RCFxg	DIA (MM)	LENGTH (MM)
8 x 50ml			50ml GLASS 34411-822		34142-104	140	3170			29	109
			50ml POLYPROPYLENE 34411-154			148	3351			29	116
			50ml POLYCARBONATE 34411-158			148	3351			29	116
			50ml GLASS GRADUATED 34411-821		34142-104	140	3170			29	109
8 x 15ml		34144-307	15ml GLASS 34411-815	34431-402		140	3170			17	107
			15ml POLYPROPYLENE 34411-131	34431-603		139	3147			17	107
			15ml POLYCARBONATE 34411-133	34431-603		139	3147			17	107

TABLE10
6 x 50 ANGLE ROTOR (MSE 43117-608). 6000 R.P.M. (MAX SPEED) MISTRAL 1000
(6500 RPM MAX SPEED MISTRAL 2000 [FIGURES IN BRACKETS])

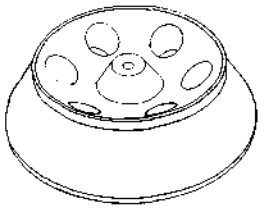


ACCESSORIES
50ml SPHERICAL END BUCKET (MSE 43156-602) (6500 RPM MAX SPEED MISTRAL 2000)
SEALED CAP ASSEMBLY (MSE 43561-162)

ADAPTOR			TUBE	CAP	CUSHION	SEALED BUCKET		OPEN BUCKET		MAX TUBE SIZE	
CAPACITY	COLOUR	CAT. NO.				RADIUS (MM)	RCFxg	RADIUS (MM)	RCFxg	DIA (MM)	LENGTH (MM)
6 x 50ml			50ml GLASS 34411-822		34142-104	111	(5243) 4468*	112	(5290) 4508*	29	110
				34431-403				112	(5290) 4508*	29	120
			50ml POLYPROPYLENE 34411-154			116	(5479) 4669	118	(5574) 4749	29	116
				34431-605				118	(5574) 4749	29	130
			50ml POLYCARBONATE 34411-158			116	(5479) 4669	118	(5574) 4749	29	116
				34431-605				118	(5574) 4749	29	130
			50ml GLASS CONICAL 34411-818	34431-403	34148-705			107	(5054) 4307*	29	115
			50ml GLASS GRADUATED 34411-821		34142-104	111	(5243) 4468*	112	(5290) 4508*	29	110
				34431-403				112	(5290) 4508*	29	120
6x	GREY	34141-114	1oz GLASS UNIVERSAL			102	(4818) 4105*	105	(4960) 4226*	29	84
6x		34141-115	STERILYN			106	(5007) 4266	109	(5149) 4387	29	90

*CHECK WITH THE TUBE SUPPLIER ON THE MAX RCFxg VALUE

TABLE11
6 x 50 ANGLE ROTOR (MSE 43117-608). 6000 R.P.M. (MAX SPEED) MISTRAL 1000 (6500 RPM MAX SPEED MISTRAL 2000 [FIGURES IN BRACKETS])

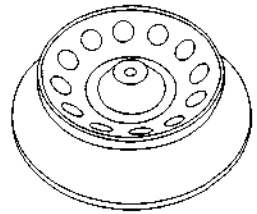


ACCESSORIES
50ml SPHERICAL END BUCKET (MSE 43156-602) (6500 RPM MAX SPEED MISTRAL 2000)
SEALED CAP ASSEMBLY (MSE 43561-162)

ADAPTOR			TUBE	CAP	CUSHION	SEALED BUCKET		OPEN BUCKET		MAX TUBE SIZE	
CAPACITY	COLOUR	CAT. NO.				RADIUS (MM)	RCFxg	RADIUS (MM)	RCFxg	DIA (MM)	LENGTH (MM)
6 x 15ml		34144-307	15mlGLASS 34411-815	34431-402		109	(5149) 4387*	110	(5196) 4427*	17	108
			15ml POLYPROPYLENE 34411-131	34431-603		109	(5149) 4387	111	(5243) 4468	17	108
			15ml POLYCARBONATE 34411-133	34431-603		109	(5149) 4387	111	(5243) 4468	17	108
			15mlGLASS CONICAL 34411-813	34431-402	43161-103			106	(5007) 4266*	17	115
			15mlGLASS CONICAL G'RTED 34411-814	34431-402	43161-103			106	(5007) 4266*	17	115

*CHECK WITH THE TUBE SUPPLIER ON THE MAX RCFxg VALUE

TABLE12
12x15 ANGLE ROTOR MSE 43117-607 6000 R.P.M. (MAX SPEED) MISTRAL 1000
(6500 RPM MAX SPEED MISTRAL 2000 [FIGURES IN BRACKETS])



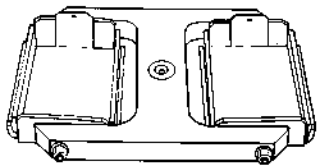
ACCESSORIES

15ml SPHERICAL END BUCKET (MSE 43156-601) (6500 RPM MAX SPEED MISTRAL 2000)

ADAPTOR			TUBE	CAP	CUSHION	SEALED BUCKET		OPEN BUCKET		MAX TUBE SIZE	
CAPACITY	COLOUR	CAT. NO.				RADIUS (MM)	RCFxg	RADIUS (MM)	RCFxg	DIA (MM)	LENGTH (MM)
12 x 15ml			15mlGLASS 34411-815	34431-402	34142-101			109	(5149) 4387*	17	108
			15ml POLYPROPYLENE 34411-131	34431-603				112	(5290) 4508	17	120
			15ml POLYCARBONATE 34411-133	34431-603				112	(5290) 4508	17	120
			15mlGLASS CONICAL 34411-813	34431-402	43161-103			107	(5054) 4307*	17	108
			15ml CONICAL G'RTED 34411-814	34431-402	43161-103			107	(5054) 4307*	17	108

*CHECK WITH THE TUBE SUPPLIER ON THE MAX RCFxg VALUE

TABLE13
MICROTITRATION ROTOR (MSE 43121-117). 2600 R.P.M. (MAX SPEED) (USED IN MISTRAL 2000)



ACCESSORIES
SUPPORT TRAY (96500-345)

MID TRAY		CORNER TRAY		NO. OFPLATES	
RADIUS (MM)	RCFxg	RADIUS (MM)	RCFxg		
113	854*	130	982*	2 PER CARRIER (TOTAL 4 PER ROTOR)	

*CHECK WITH THE PLATE SUPPLIER ON THE MAX RCFxg VALUE

14. Service Instructions

HOW TO OBTAIN SERVICE ON YOUR MISTRAL 1000 OR 2000 CENTRIFUGE

MSE is committed to giving our customers the best possible service. If your centrifuge should require service at any time please follow these procedures: -

All countries except **USA**

Contact your local MSE distributor.

USA only

For all technical enquiries contact-

Fisons Instruments (ARL) Repair Center
15300 Rotunda Drive, Suite 301
Dearborn
Michigan
48120.

Tel: 1-800-541-9069
Fax:(313)-441-3718

In order to give the best possible customer service, all repairs are to be carried out at the repair center in Dearborn, Michigan. This system guarantees your instrument will be repaired and sent out within one working day of being received. In addition, not only will we fix the fault, we will also give your centrifuge a thorough preventive maintenance check and change the brushes all within 24 hours.

If for any reason your centrifuge cannot be repaired and despatched within 24 hours we will send you a loaner instrument at our cost until your own can be repaired.

Note that all on-site repairs will be charged for travel and labour. MSE will provide warranty part replacements free of charge.

WHAT YOU MUST DO

1. Contact our repair center - have the model, serial number, date of purchase and fault description available.

2. You will be given a return goods authorization number and directions for shipping.

3. Remove all rotors, buckets and adaptors.
   Do not ship these items - only the centrifuge.

4. Thoroughly clean and disinfect the centrifuge.

5. Fill out the attached service request form and place inside the centrifuge.

6. Pack in a protective box (preferably that in which the centrifuge was originally supplied). MSE/Fisons Instruments cannot be held responsible for damage caused during shipment of inadequately packed goods.

7. Federal Express must be used to have the box shipped to the repair center. Freight must be charged to the consignee (Fisons/ARL).

MISTRAL SERVICE REQUEST

We are sorry it is necessary to have your MSE centrifuge repaired. Please take a few moments to fill out this form which wil) help us ensure you receive the best and fastest service possibie.

Model: .....

Serial number (on plate at rear of unit): .....

Date purchased: .....

From: .....

Brief description of fault: .....

.....

Date first noticed: .....

Date Repair Center first contacted: .....

Authorization number given: .....

General condition of centrifuge: .....

Has it been disinfected: .....

Disinfectant used: .....

Address: .....

.....

.....

Contact: .....

Telephone: .....

Signed: .....